

1 WHAT IS CLAIMED IS:

- 2
- 3 1. A process for making a stabilized polyalkenyl sulfonic acid comprising:
- 4
- 5 (a) reacting a polyalkene with  $\text{SO}_3$  in a first reaction vessel; and
- 6
- 7 (b) stabilizing the product of step (a) by neutralizing with a neutralizing
- 8 agent as the product of step (a) exits the first reaction vessel and
- 9 prior to or concurrently with entering a second vessel for further
- 10 reaction or storage, wherein neutralization occurs in the absence of
- 11 ammonia or sodium hydroxide.
- 12
- 13 2. The process according to Claim 1 wherein the neutralizing agent is an
- 14 alkaline earth metal hydroxide.
- 15
- 16 3. The process according to Claim 1 wherein the product of step (b)
- 17 contains less than 20% sultones.
- 18
- 19 4. The process according to Claim 1 wherein the polyalkenyl group is a
- 20 polyisobutenyl group.
- 21
- 22 5. The process according to Claim 4 wherein the polyisobutenyl group is
- 23 derived from polyisobutene containing greater than 20 mole percent of
- 24 alkylvinylidene and 1,1-dialkyl isomers.
- 25
- 26 6. The process according to Claim 5 wherein the polyisobutenyl group is
- 27 derived from polyisobutene containing greater than 50 mole percent of
- 28 alkylvinylidene and 1,1-dialkyl isomers.
- 29
- 30 7. The process according to Claim 6 wherein the polyisobutenyl group is
- 31 derived from polyisobutene containing greater than 70 mole percent of
- 32 alkylvinylidene and 1,1-dialkyl isomers.

- 1 8. The process according to Claim 2 wherein the alkaline earth metal  
2 hydroxide is calcium hydroxide.  
3
- 4 9. The process according to Claim 1 wherein the polyalkene has a number  
5 average molecular weight of about 300 to about 1000.  
6
- 7 10. The process according to Claim 9 wherein the polyalkene has a number  
8 average molecular weight of about 300 to about 750.  
9
- 10 11. The process according to Claim 10 wherein the polyalkene has a  
11 number average molecular weight of about 350 to about 600.  
12
- 13 12. The process according to Claim 1 wherein the amount of fragmentation  
14 in the product of step (b) is less than about 15%.  
15
- 16 13. The process according to Claim 1 further comprising mixing a carboxylic  
17 acid with the polyalkene prior to reacting with  $\text{SO}_3$ .  
18
- 19 14. The process according to Claim 13 wherein the polyalkene is  
20 polyisobutene.  
21
- 22 15. The process according to Claim 14 wherein the polyisobutene has a  
23 number average molecular weight of at least about 300 to about 1000.  
24
- 25 16. The process according to claim 13 wherein the carboxylic acid is acetic  
26 acid.  
27
- 28 17. The process according to Claim 1 further comprising diluting the  
29 polyalkene prior to reaction with  $\text{SO}_3$ .  
30
- 31 18. The process according to Claim 16 wherein the diluted polyalkene is  
32 mixed with carboxylic acid prior to reaction with  $\text{SO}_3$ .

- 1 19. The process according to Claim 1 further comprising the step of  
2 overbasing the neutralized product of step (b) with an alkaline earth  
3 metal basic salt.  
4
- 5 20. The process according to Claim 19 wherein water is used as a promoter.  
6
- 7 21. The process according to Claim 20 wherein the amount of water used is  
8 from about 0.5 to about 8.0 wt% of the total stabilized polyalkenyl  
9 sulfonic acid.  
10
- 11 22. The process according to Claim 19 wherein the overbasing temperature  
12 is from 100°C to about 170°C.  
13
- 14 23. The process according to Claim 19 wherein the overbasing pressure is  
15 from about 25 to about 65 psia.  
16
- 17 24. A process for overbasing polyalkenyl sulfonic acids comprising  
18 overbasing the polyalkenyl sulfonic acid with an alkaline earth metal  
19 basic salt and wherein water is used as a promoter.  
20
- 21 25. The process according to Claim 24 wherein the amount of water used is  
22 from about 0.5 to about 8.0 wt% of polyalkenyl sulfonic acid.  
23
- 24 26. The process according to Claim 25 wherein the overbasing temperature  
25 is from 100°C to about 170°C.  
26
- 27 27. The process according to Claim 25 wherein the overbasing pressure is  
28 from about 25 to about 65 psia.